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DOI: <https://doi.org/10.1086/508003>

Posted at the Zurich Open Repository and Archive, University of Zurich

ZORA URL: <https://doi.org/10.5167/uzh-63186>

Journal Article

Published Version

Originally published at:

Barzel, Yoram; Habib, Michel A; Johnsen, D Bruce (2006). Prevention Is Better than Cure: The Role of IPO Syndicates in Precluding Information Acquisition. *Journal of Business*, 79(6):2911-2923.

DOI: <https://doi.org/10.1086/508003>

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Prevention Is Better than Cure: The Role of IPO Syndicates in Precluding Information Acquisition*

I. Introduction

Asymmetry of information between issuers, underwriters, and investors plays a central role in the large literature on initial public offerings (IPOs) of corporate securities. Early on, Beatty and Ritter (1986)

* We thank Kasper Mahon Andreasen, Walid Busaba, Gilles Chemla, Michael Devereux, David Goldreich, Robert G. Hansen, Gilad Livne, Alexander Ljungqvist, Albert Madansky (the editor), Roberta Romano, Allan Schwartz, Ajai Singh, Jean Tirole, Elu von Thadden, Art Wilson, an anonymous referee, and seminar participants at BI Oslo, HEC Genève, HEC Lausanne, INSEAD, the London Business School, Northwestern University, the Yale Law School, and the Universities of Amsterdam, Cergy-Pontoise/Nanterre, Strathclyde, Tilburg, Toulouse, Warwick, and Zurich for helpful comments and discussions. Various versions of this article were presented at the Canadian Law and Economics Association meetings at the University of Toronto; the American Law and Economics Association meetings at Yale University; the meetings of the International Society for New Institutional Economics in Washington, DC; the ABN-Amro Conference on Initial Public Offerings in Amsterdam; and the Workshop on Information and Financial Markets at the University of Essex. Part of this article was written while Habib was visiting HEC Lausanne, whose hospitality is gratefully acknowledged. We gratefully acknowledge funding from NCCR-FINRISK (Habib) and the University of Pennsylvania Research Foundation (Johnsen). We are responsible for all errors. Contact the corresponding author, Michel Habib, at habib@isb.unizh.ch.

(Journal of Business, 2006, vol. 79, no. 6)

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0021-9398/2006/7906-0004\$10.00

We treat information acquisition by potential investors in initial public offerings as endogenous. With endogenous information, the critical question is why underwriters would allow investors to spend resources acquiring superior information intended solely to effect a wealth transfer. We show that an investment banking syndicate is an institutional arrangement designed to avoid such a transfer. By inviting rival banks to share in the offering, a managing underwriter ensures they have a strong incentive to remain ignorant. We characterize the resulting outcome as one of symmetric ignorance. The desire to maintain symmetric ignorance is consistent with the observed passivity of nonmanaging syndicate participants.

and Rock (1986) showed that asymmetric information can explain the most salient feature of IPOs, their systematic underpricing. Subsequent literature on IPO underpricing shows that it can be used to encourage informed parties to signal their information to the uninformed, that it can be used by the uninformed to screen the informed, and that it can be used to encourage the production of desirable information.¹ This literature identifies several institutional arrangements common to IPOs that reduce the extent of underpricing necessary to achieve signaling, screening, or the production of information. Examples of such arrangements include reliance on regulars, stabilization, syndication, and managing underwriters' unilateral discretion in making IPO allocations to intermediaries and investors.²

In virtually all of this literature, underpricing and related arrangements serve to remedy adverse selection resulting from asymmetric information. In this article, we take information asymmetry to be a consequence of "excess search" by aggressive investors, who attempt to capture wealth from others by identifying and exploiting the errors in pricing that managing underwriters inevitably make. We show that underpricing can be used to preclude the information asymmetry that would otherwise lead to adverse selection. We focus on a single institutional arrangement, the investment banking syndicate.³ We argue that information preclusion explains why managing underwriters require members of the underwriting syndicate to behave passively with respect to valuing and pricing an issue, engage in "reciprocal participations" with syndicate members across successive IPOs, and maintain stable syndicate membership over time.⁴

To show how information asymmetry can be precluded, we consider the case of an investor who can, at a cost, acquire information about the value of a new issue. To deter the investor from doing so, the underwriter offers to sell shares at a discount. The discount is such that the investor is indifferent between (i) acquiring information at a cost and then using it to "pick and choose" between over- and underpriced issues and (ii) refraining from ac-

1. See Allen and Faulhaber (1989), Grinblatt and Hwang (1989), and Welch (1989) for signaling models of underpricing; Benveniste and Spindt (1989) and Benveniste and Wilhelm (1990) for screening models; and Benveniste, Busaba, and Wilhelm (2002), Maksimovic and Pichler (2001), Sherman (2000), and Sherman and Titman (2002) for models in which information is to be produced.

2. See Benveniste and Spindt (1989) and Sherman (2000) for an analysis of regulars; Benveniste, Busaba, and Wilhelm (1996) and Chowdhry and Nanda (1996) for that of stabilization; Chowdhry and Nanda (1996) and Pichler and Wilhelm (2001) for that of investment banking syndicates; and Benveniste and Wilhelm (1990) and Sherman (2000) for that of underwriter discretion.

3. In an earlier version of the article, we also considered regular investors and stabilization. We argued that these arrangements are consistent with information preclusion.

4. The term "reciprocal participation" appears in the government's complaint in *U.S. v. Morgan Stanley & Co., et al.*, 118 F. Supp. 621 (1953), an antitrust case in which the U.S. Department of Justice sought unsuccessfully to enjoin 17 major bracket banks from monopolizing the investment banking business through this and other institutional arrangements. It refers to underwriters' practice of regularly inviting one another to share in their offerings. See Sec. V for evidence of passivity, reciprocity, and stability.

quiring information and “buying blind” in all issues. In equilibrium, the investor acquires no information and there is no information asymmetry. We characterize this equilibrium as one of symmetric ignorance.

To analyze the investment banking syndicate, we consider the case of multiple investors. We note that investment banks are likely to be especially shrewd investors if left outside the syndicate. By inviting rival banks to share in the offering subject to syndicate rules and government regulations, the managing underwriter ensures that they have a strong incentive to remain ignorant and to avoid spoiling the deal.

Our analysis of IPOs follows general work by Fama and Laffer (1971), Hirshleifer (1971), and Barzel (1977, 1982), and on the problem of “excess search” and the role of private institutions in limiting this problem. In Hirshleifer’s terms, “private foreknowledge” is information used to identify pricing errors after resource allocation is fixed. Because it results in a pure wealth transfer but is costly to produce, it reduces social surplus. As Fama and Laffer point out, some of what can be described as “speculation” relies on private foreknowledge. This may account for the negative connotation sometimes given to the word “speculator.” As opposed to private foreknowledge, “discovery information” is produced prior to the time that resource allocation is fixed, and because it positively affects resource allocation, it generally increases social surplus. But even discovery information can be overproduced because optimal expenditures on discovery information will inevitably be subject to pricing errors that can be exploited by those who gather superior information. In cases of both fixed and variable resource allocation, then, excess search has the potential to occur, and private parties will adopt institutional arrangements to avoid the associated losses.

We proceed as follows. In Section II, we model the maximization problem an underwriter faces when hired by an issuer to sell shares to a single investor. We begin by illustrating a simple benchmark case of “symmetric ignorance,” in which all parties have identical but imperfect information and the cost of acquiring further information is prohibitive. We then introduce adverse selection, where only the investor can acquire costly information about the aftermarket price of the shares.

In Section III, we show that the parties’ joint payoff increases if the investor can commit to remaining ignorant. Even if this commitment cannot be enforced, the underwriter can ensure that the investor remains ignorant by underpricing enough to provide him with a self-enforcing rent.

In Section IV, we extend our model to the case of multiple investors and provide an explanation for investment banking syndicates. In Section V, we discuss the available evidence in support of our analysis. A distinctive implication of our analysis is the passive behavior of nonmanaging syndicate participants, as the managing underwriter seeks to prevent the creation of a problem of adverse selection. This is in contrast to those authors who view syndicates as serving to remedy the problem of adverse selection. These predict that syndicate participants should be active in valuing and pricing the

issue (Pichler and Wilhelm 2001) and in stabilizing it (Chowdhry and Nanda 1996). The available evidence appears to be consistent with our analysis.

Section VI provides a brief discussion and some concluding remarks. The problem of excess search no doubt exists to some extent for all securities and, in fact, for virtually all experience goods. Even in secondary security markets, where a substantial amount of the information acquired by market participants is intended to improve resource allocation, we believe that many institutional arrangements can be partially explained as a response to the problem of excess search.

We stress that it is not our contention that there is no information revelation in IPOs. Clearly, this is the purpose of book building.⁵ Our contention, instead, is that where information is costly to produce and has no role in guiding investment decisions, there are benefits to devising arrangements that preclude the production of information. Thus, there should be in IPOs both information revelation and information preclusion. The information that is revealed is that produced at zero or low cost or used to guide investment decisions. The production of costly information whose sole purpose is to transfer wealth is precluded. Investment banking syndicates may be one way to do so.

II. The Initial Setting

A. Simple Symmetric Ignorance

An issuer contracts with an underwriter to sell a share issue in an IPO. Without loss of generality, we normalize the number of shares to one. We initially assume the underwriter approaches a single investor.⁶ We assume the issuer and the underwriter have identical incentives and that all parties are risk neutral.⁷

We let x denote the aftermarket value of the issue. We assume x ranges over the interval $[x_l, x_h]$. We further assume that x_l is the value of the issue if retained by the issuer and normalize x_l to zero without loss of generality. Neither the issuer, the underwriter, nor the investor knows x prior to the offering, although all of them know the distribution $F(\cdot)$ of x and its expectation $\bar{x} \equiv E[\tilde{x}]$.⁸ We characterize their relationship as one of symmetric ignorance. With risk neutrality and symmetric ignorance, the underwriter sells the entire issue to the investor at a price $P^{si} \equiv \bar{x}$. On average, the investor receives exactly what he pays for and earns a normal return.

5. For extensive empirical evidence, see, e.g., Hanley (1993), Hanley and Wilhelm (1995), Cornelli and Goldreich (2001, 2003), and Ljungqvist and Wilhelm (2002).

6. We consider the case of multiple investors in Sec. IV.

7. See Baron (1982) and Baron and Holmström (1980) for an analysis of the agency problem between issuer and underwriter.

8. We assume that the cumulative distribution function $F(\cdot)$ and probability density function $f(\cdot)$ satisfy the monotone hazard property, i.e., $1 - F(x)/f(x)$ is decreasing in x .

B. Asymmetric Information and Adverse Selection

Suppose the investor can establish an informational advantage by spending c to learn the exact value of x prior to deciding whether to invest. This information provides him with a valuable option because it allows him to “pick and choose” between overpriced ($x < P$) and underpriced ($x > P$) offerings. The option to pick and choose creates a problem of adverse selection for the underwriter, who must now choose the price P to be such that

$$\max_P [1 - F(P)]P$$

This problem has first-order condition,

$$\begin{aligned} -f(P)P + [1 - F(P)] &= 0, \\ \Leftrightarrow P &= \frac{1 - F(P)}{f(P)}. \end{aligned} \quad (1)$$

Denote P^{as} the solution to equation (1). The presence of adverse selection decreases the issuer’s expected proceeds, as the issue remains unsold when $x < P^{as}$. Formally,

$$\begin{aligned} P^{si} &= \bar{x} \\ &= \int_0^{P^{as}} xf(x)dx + \int_{P^{as}}^{x_h} xf(x)dx \\ &> \int_{P^{as}}^{x_h} P^{as}f(x)dx \\ &= [1 - F(P^{as})]P^{as}. \end{aligned}$$

III. Precluding Information Acquisition

A. A Commitment to Symmetric Ignorance

The preceding analysis shows that the underwriter’s response to the investor’s ability to acquire information requires the issuer to forgo the sale of the issue in the cases $x < P^{as}$. The problem of adverse selection therefore prevents the parties from reaping the gains from trades that would be obtained from such sale.⁹ The underwriter can devise a superior arrangement, however, by offering the investor the right to buy the issue at a discount, provided the investor will

9. This is a variant of Akerlof’s (1970) well-known result.

commit to doing so in advance.¹⁰ The discount provides the investor with the same expected payoff he would receive, net of c , if he were to acquire information and pick and choose. The commitment price, P^{cm} , is such that

$$\begin{aligned}\bar{x} - P^{cm} &= E \max [x - P^{as}, 0] - c, \\ \Leftrightarrow P^{cm} &= \bar{x} - E \max [x - P^{as}, 0] + c.\end{aligned}\quad (2)$$

The discount, $E \max [x - P^{as}, 0] - c$, is the value of the option to pick and choose, net of search costs. As a result, the investor is indifferent between (i) committing to buy at P^{cm} and (ii) declining to do so, learning the exact value of x at cost c , and using his knowledge of x to pick and choose among offerings.

By precluding the investor from acquiring information, the underwriter avoids the problem of excess search and adverse selection. This increases the issuer's proceeds by ensuring the issue sells when $x < P^{as}$ and by avoiding c . Formally,

$$\begin{aligned}P^{cm} &= \bar{x} - E \max [x - P^{as}, 0] + c \\ &= \bar{x} - P^{as} + P^{as} - E \max [x - P^{as}, 0] + c \\ &= E \max [x - P^{as}, 0] + E \min [x - P^{as}, 0] \\ &\quad + P^{as} - E \max [x - P^{as}, 0] + c \\ &= F(P^{as})E[x - P^{as} | x < P^{as}] + P^{as} + c \\ &= [1 - F(P^{as})]P^{as} + F(P^{as})E[x | x < P^{as}] + c \\ &> [1 - F(P^{as})]P^{as}.\end{aligned}$$

B. A Self-Enforcing Commitment to Symmetric Ignorance

The commitment solution assumes that the investor can costlessly commit to buying the issue at a price of P^{cm} before spending c to learn the exact value of x . But the investor's commitment is not necessarily credible.¹¹ In particular, suppose $P^{cm} < P^{as}$.¹² From equation (2), this implies that

$$E \max [x - P^{cm}, 0] - c > \bar{x} - P^{cm}.\quad (3)$$

The right-hand side of this inequality is the investor's expected payoff from

10. Benveniste and Spindt (1989) and Benveniste and Wilhelm (1990) show that the underwriter can correct the information asymmetry by establishing a screening mechanism—book building—to induce the investor accurately to reveal his knowledge of x . In the context of our simple model, however, screening can be shown to leave the issuer's expected proceeds unchanged at $[1 - F(P^{as})]P^{as}$.

11. We assume that the underwriter's commitment to sell at a given price is made credible by its reputation. See Beatty and Ritter (1986), Booth and Smith (1986), Carter and Manaster (1990), Megginson and Weiss (1991), Beatty and Welch (1996), Nanda and Yun (1997), Carter, Dark, and Singh (1998), Cooney et al. (1999), Habib and Ljungqvist (2001), and Logue et al. (2002) for an analysis of underwriter reputation.

12. This would be the case if $F(x) \sim U[0, x_h]$, e.g., because $P^{as} = \bar{x} > P^{cm}$ in such a case.

honoring his commitment to buy the issue at the price P^{cm} , that is, buying blind. The left-hand side is his expected payoff from spending c to learn x and reneging on his commitment if $x < P^{cm}$, that is, picking and choosing. The inequality indicates that the investor will prefer to learn the exact value of x and renege on his commitment if this value is low.

A remedial response by the underwriter is to make the investor's commitment self-enforcing. This requires the issue price to be such that the inequality in equation (3) holds as an equality, making the investor indifferent between honoring the commitment, on the one hand, and spending c and reneging on his commitment if x is low, on the other hand. Specifically, we define the self-enforcing price, P^{se} , to be such that the investor's discount equals the expected value of the option to pick and choose net of search costs,

$$E \max [x - P^{se}, 0] - c = \bar{x} - P^{se}. \quad (4)$$

Note that $P^{se} < P^{cm}$ because

$$\frac{\partial [E \max (x - P, 0) - c - (\bar{x} - P)]}{\partial P} = \frac{\partial [-\int_0^P (x - P)f(x)dx - c]}{\partial P} > 0. \quad (5)$$

IV. Multiple Investors and Investment Banking Syndicates

We now introduce multiple investors. Consider the case in which there are N investors who have costs of acquiring information $c_1 > c_2 > \dots > c_N$. Assuming the fraction of the firm sold is divided equally among the N investors, and bearing in mind that the self-enforcing price P^{se} must be such that all investors, including the investor with lowest information acquisition cost c_N , must be precluded from acquiring information, we note that the self-enforcing price is such that

$$\begin{aligned} E \max \left[\frac{x}{N} - \frac{P^{se}}{N}, 0 \right] - c_N &= \frac{\bar{x}}{N} - \frac{P^{se}}{N}, \\ \Leftrightarrow E \max [x - P^{se}, 0] - Nc_N &= \bar{x} - P^{se}. \end{aligned} \quad (6)$$

Using the implicit function theorem, we can show that $\partial P^{se} / \partial Nc_N > 0$. This suggests that the self-enforcing price P^{se} is maximized by selling the issue to n investors, where $n = \arg_{\hat{n}} \max \hat{n}c_{\hat{n}}$. Should $n < N$, the remaining $N - n$ investors should be prevented from taking part in the offering.

Such prevention may, however, be difficult to achieve. For example, the $N - n$ investors prevented from taking part in the offering may collude with those taking part to acquire information and share the gains from picking and

choosing.¹³ Alternatively, the $N - n$ investors may invest through confidential nominee accounts. Picking and choosing is profitable when the offer price has been predicated on a minimum information acquisition cost of c_n , but the information acquisition cost of some investors is smaller than c_n .¹⁴

Syndication has the desired effect. The managing underwriter precludes those with low costs of gathering information from participating in the offering as investors by inducing them to join the syndicate, thereby providing them with a residual share of profits from a successful offering while subjecting them to various contractual and regulatory restrictions that encourage passivity. The managing underwriter constrains the ability of syndicate members to profit from acquiring information by dictating the prices at which they buy and sell the shares they have been allocated: syndicate members buy at the issue price minus the spread; they sell at the issue price.¹⁵

Syndicate participants are further constrained in their ability to profit from acquiring information by the prohibition on price discounting and preselling imposed by the Securities Act of 1933. Syndicate members may not offer any price discount other than to securities dealers nor may they agree to sell the shares they have been allocated until the official offering date. Prior to passage of the act, rival banks apparently used discounting and preselling to "poach" one another's investors (Mahoney 2001).¹⁶ In the context of our analysis, both practices would have increased the value from acquiring information. It is no surprise that established banking houses, whose reputations relied most heavily on survival of the syndicate system, lobbied successfully to have these practices prohibited with passage of the act and through subsequent regulation.

This begs the question of why, or under what circumstances, an investor would forgo the opportunity for profitable speculation to join the syndicate and share in the underwriting residual, which is occasionally negative. For the most part, syndicate members consist of other investment banks, who clearly have expertise in valuing new issues and for whom the prospect of speculative profits is no doubt especially tempting. Our answer is that between rival banks the speculation problem is reciprocal. All banks are in a position to manage their own offerings from time to time in which they face the problem

13. The possibility for all investors to collude would change eq. (6) to

$$E \max [x - P^{se}, 0] - c_N = \bar{x} - P^{se}.$$

It reinforces the desirability of not allowing those investors with low cost of information acquisition to take part in the issue.

14. We believe it is to investors such as these that Harold L. Stuart of Halsey, Stuart, and Co. alludes in his testimony regarding the use of penalty bids by underwriters: "you simply had to have a [penalty] clause in order to make this business function in putting the securities on the market [because] there were many ways that shrewd people could beat the game and spoil the putting of any security on the market unless you did this" (*U.S. v. Morgan*, 643).

15. This is in contrast to investors. Investors who have been allocated shares in the IPO buy at the issue price. In the absence of stabilization, they sell at the market price, rather than one set by the managing underwriter. Other investors buy and sell at the market price.

16. These practices were known as "shading" and "beating the gun," respectively (Willis and Bogen 1929, 420–22).

of excess search by outsiders. Reciprocal participation by a group of investment banks in one another's offerings is a widely recognized feature of the syndicate system (*U.S. v. Morgan*, 629 and 738; Corwin and Schultz 2005). Reciprocity establishes a tit-for-tat framework to discourage speculative wealth transfers (Hoffman, McCabe, and Smith 1998) and increase issuer proceeds.¹⁷

What if the speculation problem is not reciprocal? Such is the case when a smaller, less prestigious investment bank is tempted to speculate in the larger, presumably more profitable offerings of a larger, more prestigious investment bank, but the smaller, less profitable offerings underwritten by the less prestigious bank present no temptation to the more prestigious bank. In such case, reciprocity may no longer be necessary, and stability may suffice for the purpose of precluding information acquisition. The more prestigious underwriter includes in his syndicate his less prestigious counterpart, but the less prestigious underwriter has no need to reciprocate. The less prestigious underwriter forgoes the gains from speculation, despite the lack of a reciprocal speculation problem, because his opportunity for profitable speculation likely varies across the issues underwritten by the more prestigious underwriter, possibly in line with the smaller, less prestigious underwriter's familiarity with the firm taken public and the industry and market in which it operates.¹⁸ In contrast, stable participation affords the less prestigious underwriter a more predictable share of the profits of the issues underwritten by the more prestigious underwriter. The less prestigious underwriter need not be offered participation in every single syndicate managed by his more prestigious counterpart but in enough syndicates for him to be compensated for forgoing the gains from speculation.¹⁹

V. Empirical Evidence

We have argued that the syndicate system encourages a collective norm of symmetric ignorance among the investment banks that act as syndicate participants. This suggests that syndicate participants are expected to behave passively when it comes to information acquisition. The available evidence

17. Anand and Galetovic (2000) show that commitments of the sort can be sustained in oligopolistic markets such as investment banking.

18. Larger, more prestigious underwriters are less likely to be so limited in their ability to profit from speculation because of their more extensive coverage of industries and markets.

19. Underwriting syndicates exhibit some similarity to the diamond "sights" organized by De Beers for its approved list of wholesale buyers. A sight consists of a box containing several envelopes of diamonds. The box bears the buyer's name and a price. De Beers selects the quality and cut of the diamonds in each envelope according to the buyer's prior indication of interest. Buyers are allowed to inspect the diamonds in the box and can accept or reject it, but they cannot negotiate its price nor can they pick and choose among the diamonds in the box. A buyer who rejects too often risks being dropped from the exclusive list of approved buyers. Barzel (1977) argues that sights are intended to prevent dealers from acquiring socially redundant information about the quality of the diamonds. Buyers covet being on De Beers's approved list, revealing that the diamonds are systematically underpriced. See Barzel (1977) and Kenney and Klein (1983) for further details.

suggests that, with the exception of comanagers, syndicate members are, in fact, passive. Evidence in both the brief on general points and the court opinion in *U.S. v. Morgan* suggests that the managing underwriter does not solicit their input in valuing and pricing the issue.²⁰ More recently, Corwin and Schultz (2005) report evidence of nonmanaging syndicate participant passivity during the book-building process. Specifically, they find that the likelihood that positive, private information revealed in the book-building process is incorporated into the offer price does not depend on the number of nonmanaging syndicate participants (Corwin and Schultz 2005, table 4, panel A).²¹ The results are different for negative private information, in which case the number of nonmanagers does affect the likelihood of incorporating the information (Corwin and Schultz 2005, table 4, panel B), but the lack of significance of nonmanagers is reestablished when combining positive and negative private information (Corwin and Schultz 2005, table 4, panel C). Chen and Ritter (2000, 1120–21) and Eccles and Crane (1988, 94) note the passivity, or at least the noninvolvement, of nonmanaging syndicate participants with respect to selling activity, and Ellis, Michaely, and O'Hara (2000, 1054) note the passivity of nonmanaging syndicate participants with respect to stabilization operations.

The analysis in Section IV predicts that the investors invited to join the syndicate are the $N - n$ investors with the lowest information acquisition costs. Consistent with this prediction, Corwin and Schultz (2005, 444) find that, with the exception of small IPOs, "having a top-ranked analyst in the issuer's industry significantly increases the likelihood that an underwriter is included in a syndicate either as a co-manager or in a non-managing role." Corwin and Schultz further find that "underwriters are more likely to be included in a syndicate if they are in the same state as the issuer, particularly if the book manager is based elsewhere" (444). Having a top-ranked analyst and being in the same state likely proxy for a low information acquisition cost.

Finally, Corwin and Schultz find strong evidence of stability and reciprocity in syndicate participation. In their words, "the single strongest determinant of whether an underwriter is included in a syndicate is participation in recent syndicates led by the same book manager. Almost as important is whether the book manager participated in recent offerings managed by the syndicate member" (Corwin and Schultz 2005, 444).

We note that nonmanaging underwriter passivity can coexist with comanaging underwriter activity. Indeed, it is precisely such a pattern that is reported by Corwin and Schultz (2005) regarding the incorporation of pos-

20. Indeed, our understanding is that, prior to the advent of book building, the managing underwriter invited syndicate members to participate only a few days before the actual offering (Willis and Bogen 1929, 382).

21. Using the Herfindahl index instead of the number of nonmanaging syndicate participants, Corwin and Schultz (2005, table 4, panel A) find significance at the 10% level in one of two formulations that use the index. But their computation of the index does not distinguish between managing and nonmanaging syndicate participants.

itive private information, for example. The coexistence of passivity and activity applies not only to information preclusion and information production but also to considerations such as the “analyst lust” hypothesis put forward by Loughran and Ritter (2004). According to this hypothesis, issuers concerned with analyst coverage may purchase coverage at the time of the IPO by offering syndicate membership to the investment banks that employ the desired analysts. Again, Corwin and Schultz provide supportive empirical evidence for comanagers but not for nonmanaging syndicate participants.

VI. Discussion and Concluding Remarks

Our analysis focuses narrowly on the interests of the issuer, the underwriter, and knowledgeable investors. Although symmetric ignorance might be in their private interest, stock prices have welfare consequences that reach much further in the economy. If information acquisition in secondary markets is generally thought to improve resource allocation by increasing the accuracy of prices, one might ask why the informational problems posed by IPOs are any different than those posed by secondary market trading.

We have two responses to this question. First, the IPO market is somewhat unique because the firm as a going concern is being priced and sold for the first time, and information problems are therefore more acute than in secondary markets in which information unfolds incrementally. Unlike secondary markets, where a great deal of valuation is conditional on the most recent price, in the IPO market valuation is unconditional. This raises *ex ante* uncertainty and, at the margin, implies that the potential losses from excess search are relatively large in relation to the value of discovery information. Until an issue is properly placed, its price is therefore likely to be a relatively poor signal for those in the economy who might rely on it in making resource allocation decisions. The IPO market provides an ideal setting for studying how the problem of excess search affects institutional arrangements and, more broadly, the trade-off between discovery information and private foreknowledge.

Our second response is that even if secondary securities markets are dominated by search for discovery information, the problem of excess search persists at the margin. We therefore expect our analysis to have considerable power in explaining evolved market institutions, not only for securities markets but for any experience good. For example, Barzel (1982) shows that warranties, brand names, sharing arrangements, and allocation limits preclude excess search in the market for new products. Following Barzel (1977, 1982), Kenney and Klein (1983, 2000) show that the bygone practice of block-booking first-run films by motion picture houses precluded excess search by exhibitors and facilitated self-enforcing distribution contracts. Coase (1937) argued early on that the very reason for the existence of firms is to economize on the cost of using prices, and Barzel (1982) shows in detail that organization within the firm precludes workers from inefficiently picking and choosing between sequential inputs and outputs in the production process. Though the problem

of excess search is by no means the sole explanation for evolved institutional arrangements, recognizing the subtle interplay between discovery information and private foreknowledge should allow researchers to develop a more nuanced understanding of their observed patterns.

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